

Fixed Gear Sampling

Focus Questions:

- What is a fixed gear vessel and how does it operate?
- How is information collected on fixed gear vessels and what forms are used?

Chapter Outline:

- I. Fixed Gear Description
- II. Collecting and Documenting Trip and Total Catch Information
- III. Collecting and Documenting Catch Category Weight
- IV. Collecting and Documenting Species Composition
- V. Examples

I. Fixed Gear Description

Hook and Line Gear

Numerous varieties of commercial fishing gear use hooks and lines in different configurations to catch finfish. The most common gear configurations include longline, vertical hook and line, jigs, handlines, rods and reels, vertical and horizontal setlines, troll lines, and stick (pipe) gear.

Groundline/Mainline-

The length of line to which all of the hooks are attached. This line is the “backbone” of the longline gear.

Gangion-

The length of line that connects the hook to the groundline. It is often one to two feet long.

Longline Gear

This gear type involves the setting out of a long horizontal line (**groundline/mainline**) to which other short lines (**gangions**) with baited hooks are attached. The groundline is secured between anchored lines and identified by floating surface bouys, bamboo poles, and flags. The groundline is laid along or just above the ocean floor (bottom longline) (See Figure 5-1).

To deploy longline gear, the vessel sets the first anchor and then steams ahead, following a selected pathway with the groundline and baited hooks being set off the stern of the boat. Hooks are usually baited by hand with squid, herring, octopus, or cod. Hooks of various sizes are attached to gangions of various lengths that are tied on or snapped onto the line at desired intervals. Hook size and spacing, depth, and soak time (fishing time) vary.

Block- A hydraulically driven wheel into which the groundline is placed during gear retrieval. As the wheel spins the groundline is drawn aboard.

Rollerman – A crewman who stands where the fish are coming in and brings them aboard using a gaff. The rollerman lands any commercially valuable fish and excludes any non-commercially valuable fish from being landed.

Crucifier- A pair of rollers or steel pegs which stand vertically with only enough room for the groundline to pass between. During gear retrieval, the groundline passes between the rollers and the hooks are pulled out of the fish.

Longline gear is retrieved by pulling in the groundline and landing one gangion and hook at a time. On most longliners (See Figure 5-2), the vessel pulls the buoy aboard then pulls up the anchor using a **block**. The **rollerman** transfers the groundline to the block and begins hauling the groundline. The line comes in over the rollers, through the **crucifier**, over the block, and then is coiled. A rollerman stands at the railing of the vessel and helps the fish aboard. Some longliners on the West Coast manually pull the buoy

anchor and groundline aboard. Sablefish, Pacific halibut, spiny dogfish, and other groundfish are often targeted with longline gear.

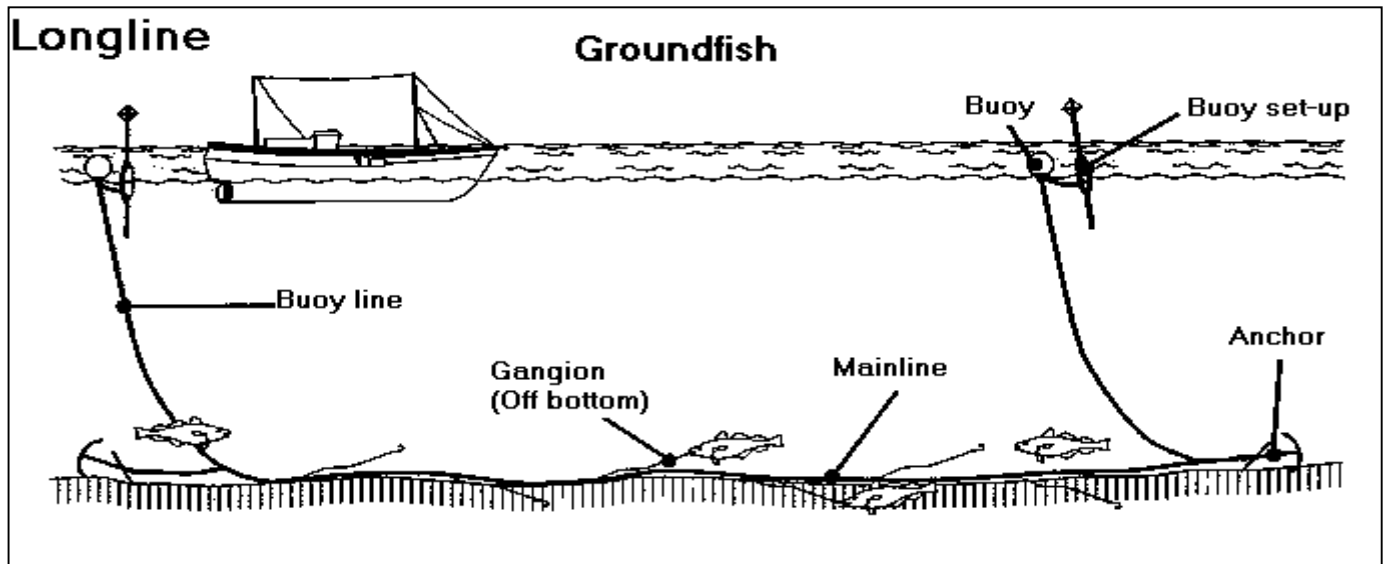


Figure 5 -1: Longline Gear Set-Up

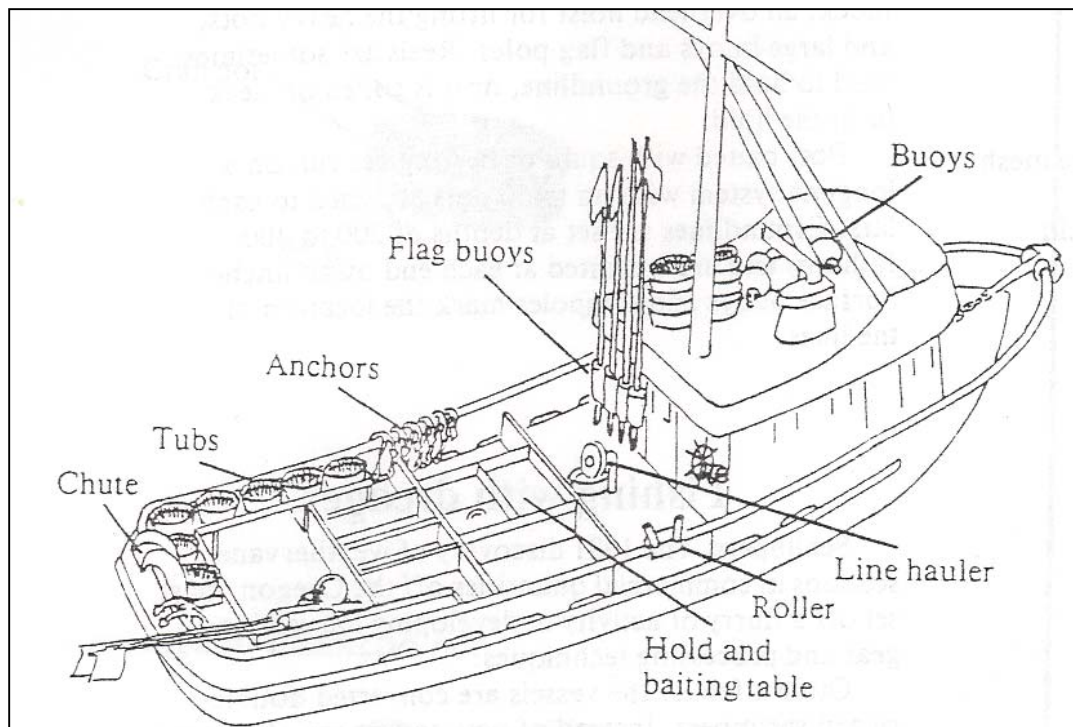


Figure 5 - 2: Longline Vessel

Jigging – A method of fishing where fishing line is either mechanically or manually manipulated. The movement of the line creates a bouncing of the lure within the water column or along the substrate.

Hoochies- A rubber lure that looks like a small squid and is available in a variety of colors.

Handline and Jig Gear

Handline and **jig** fisheries use vertical, weighted monofilament lines with baited hooks attached at intervals with swivels. The hooks are attached to the groundline and are dressed up with colorful segments of rubber surgical tubing, **hoochies**, or bait (herring or other fish). The jig is dropped to the bottom either by hand or with mechanical gear. The line is then usually lifted a short distance off the bottom and jigged vertically up and down to produce movements of the hoochies or bait to induce the fish to bite.

Mechanical jigs (See Figure 5-3) are automated to let out and reel in line as programmed. They can be programmed to sense when the gear hits the seabed and automatically pull in enough line so that the hooks stay a few feet above the bottom to avoid snagging. When the pre-set weight of fish has been hooked, the jigger can automatically reel in the line. Mechanical jiggers will generally utilize between six and sixteen hooks on gangions and many lines can be actively jigged. Handlines and jigs are used to harvest lingcod, greenlings, cabezon and rockfish.

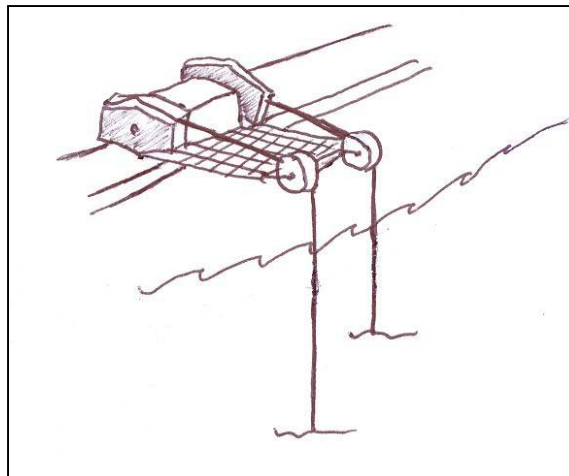


Figure 5-3: Mechanized jig Assembly

Stick (Pipe) Gear

Stick (Pipe) gear is usually a piece of rebar (metal stake) or PVC tube with rebar inside that has string or twine attached at both ends (See Figure 5-4). Some fishers use a flexible plastic coated cable with a lead weight attached instead of a hard stick, referred to as ‘cable gear’. Hooks are attached directly to the string and baited with squid, mackerel, or bonita. This gear is often used in shallow water kelp and surf grass beds (0-40 ft). Usually there is only one stick per buoy line, but multiple sticks can be connected together by groundline. The sticks can range in size from 3-6 ft in length. Hooks per stick can vary from 3-10 hooks. Stick (Pipe) gear is used to target shallow and deep near shore rockfish, lingcod, greenlings and cabazon.



Figure 5 - 4: Stick Gear

Rod and Reel Gear

Fishers using rod and reel gear utilize traditional fishing poles, usually with two or more hooks on each pole (See Figure 5-5). Flashers, hoochies, and bait are used to attract fish to the hooks. Lines may be cast or trolled and are weighted with round, pyramid, or crescent shaped sinkers. Weighted lines and hooks are cast overboard and allowed to descend to the desired depth. When a fish is on the line, they are reeled back in. When multiple hooks are fished, each hook may be fished from “dropper” line attached to the main fishing line. Rod and Reel gear targets rockfish, CA sheephead, sanddabs, lingcod, greenlings and cabezon.



Figure 5 - 5: Rod and Reel Gear and Catch

Vertical Hook and Line (Also called vertical longline, buoy or Portuguese longline)

Vertical longline gear is used in Southern California and Oregon. This hook and line gear involves a single line weighted at the bottom and buoyed at the surface so as to fish vertically. Baited hooks are tied to the mainline (See Figures 5-6). Wind and waves jiggle the buoy, which wiggles the line and hooks to attract fish. Vertical Hook and Line gear is used to target rockfish.



Figure 5-6: Vertical Hook and Line Gear and Vertical Hook and Vertical Hook and Line Gear Schematic

Outrigger-

Any pole that can be lowered over the side of a boat used to enhance stability and aid in fishing

Troll Gear

Trolling involves towing multiple fishing lines behind a vessel (See Figure 5-7). Fish lines are attached to a pair of **outriggers** that are lowered to approximately 45-degree angles from the boat when fishing.

Gurdies-

Powered spools or reels

Fishing lines are set and retrieved using **gurdies** mounted on the vessel in sets of two, three or four. Each gurdy spool, usually powered by hydraulics, contains and works one main line.

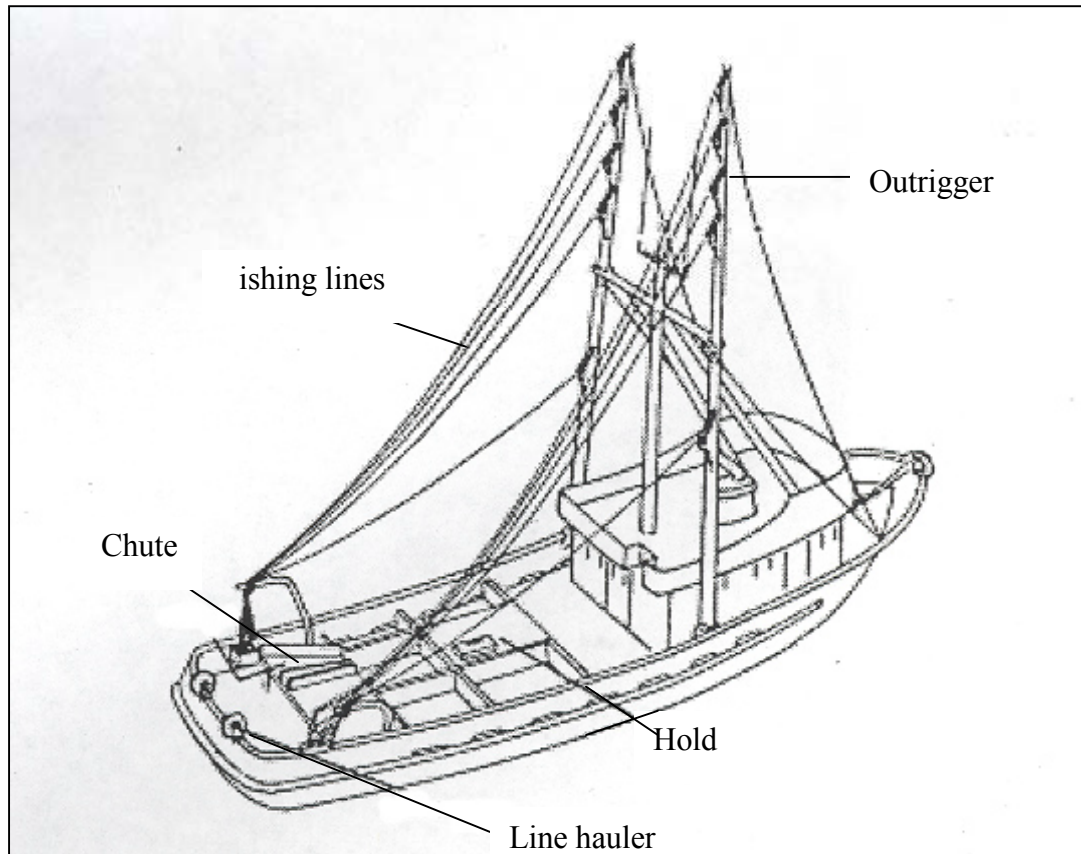


Figure 5 - 7: Troll Gear (with outriggers in non-fishing position)

Albacore Troll Fishery

Vessels targeting albacore tuna range in size from 40 feet to 70 feet and tow up to 13 lines from the outrigger poles and the stern. Lines are generally unweighted and a single lure called a 'jig' is attached to the end of each (See Figure 5-8). Jigs have metal heads, plastic skirts or feathers, and large, barbless double hooks. Fish are pulled aboard by hand or by line haulers (pulleys) located on the stern.

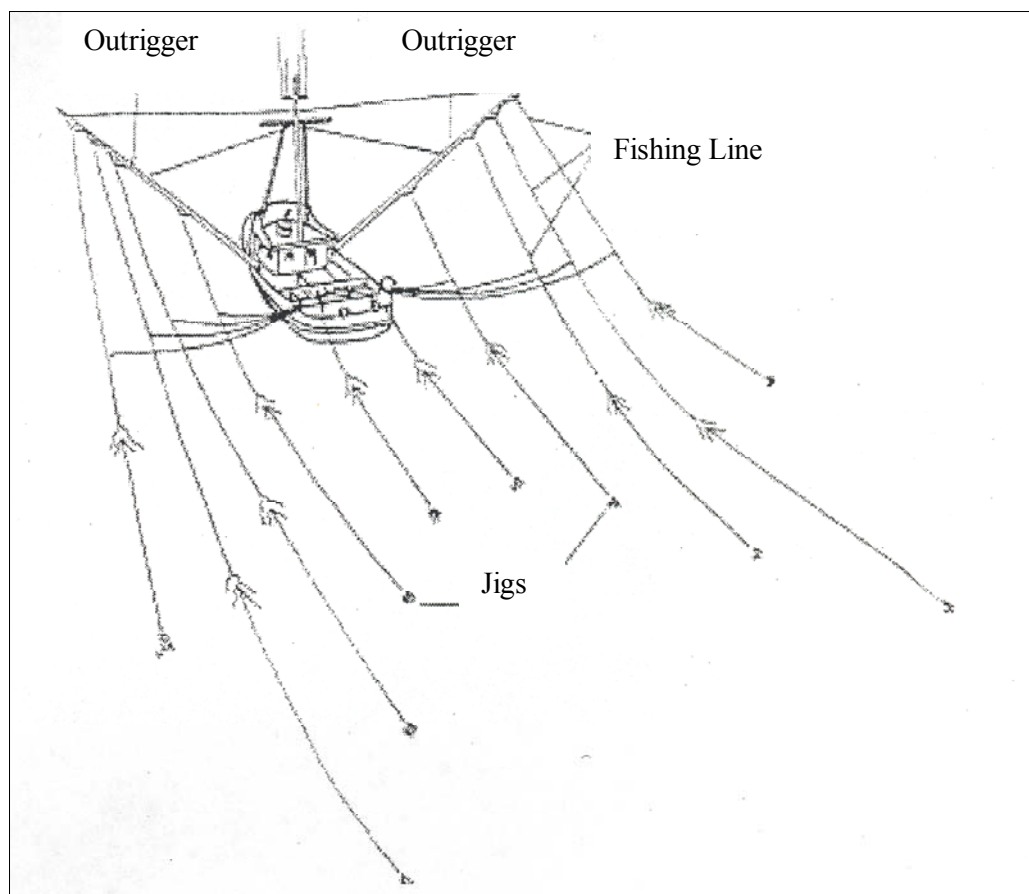


Figure 5 - 8: Albacore Troll Vessel (with outriggers in fishing position)

Groundfish Troll Fishery

Groundfish are targeted using several varieties of troll gear. One of the more common types utilizes a five to seven foot bar. The gear is often called ‘dingle bar’ gear because there is a distinct ‘ding’ transmitted up the steel trolling wire any time the bar touches bottom. The gear is designed to be fished three to six feet above rocky bottom and the iron bar is allowed to touch the bottom only occasionally to adjust for varying depths. Fishing lures are hung from multiple gangions attached to each line. The jigs are baited with large plastic worms called ‘scampies’ and are sometimes tipped with bait. This gear is very selective and is used primarily to target lingcod or Pacific halibut.

Other groundfish trolling is similar to above described ‘dingle bar’ gear, except it uses a bent steel bar rigged at the end of the steel main line (trolling wire). The bend in the bar assists the bar to slide over the seabed or rocks. It is attached to the mainline by a breaking strap that will break if a hang-up occurs. Gangions with weighted hooks are connected to each swivel of the string. At the end of the string, a rigid plastic float is rigged to provide drag and flotation to keep the string and hooks horizontal and suspend the hooks just above the bottom. Ten to fifteen of these strings may be attached to main line above the bent weight bar at various depths to target rockfish congregating at different depths around rock pinnacles.

To fish a number of depths near the surface, floats are rigged on the main lines and heavy weights are attached to their ends. By adjusting the weights, length of main line and location of gangions, the hooks can be rigged to fish a range of depths within the desired band (See Figure 5-9).

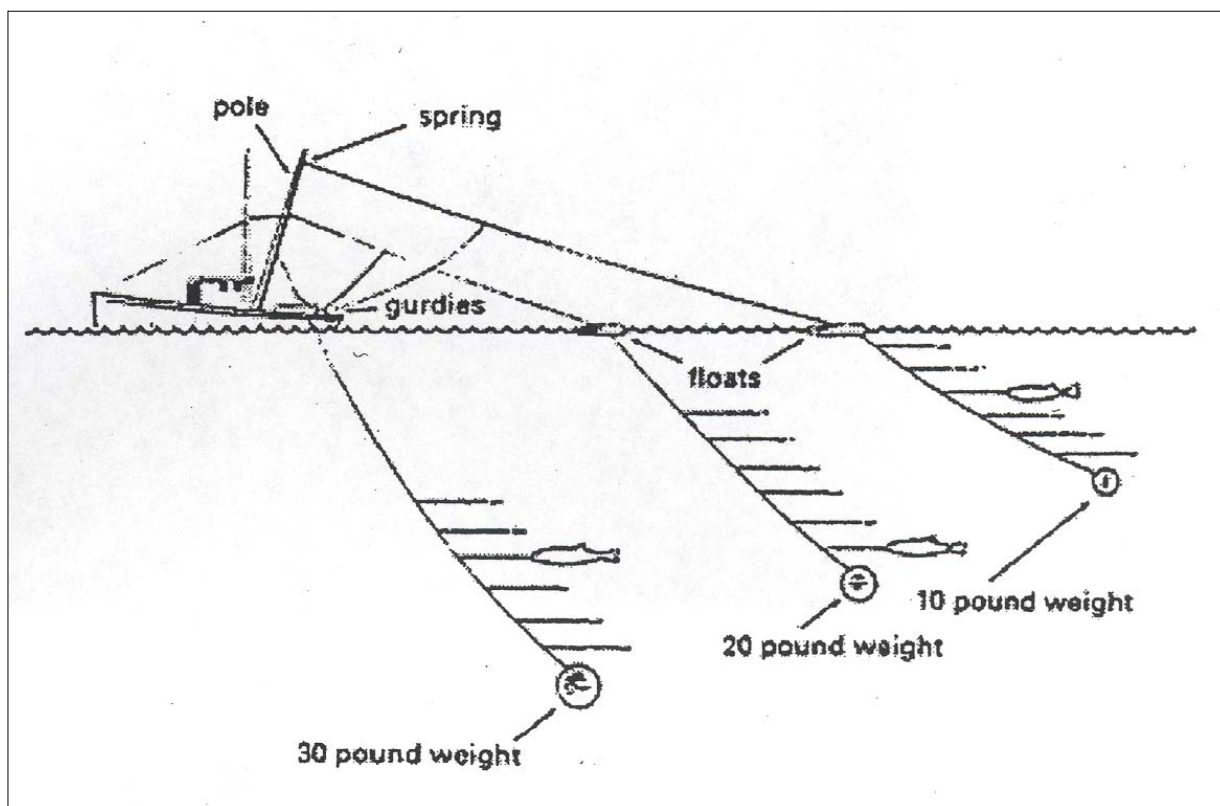


Figure 5 - 9: Groundfish Troll Gear



Pots

The words “pot” and “trap” are used interchangeably to mean baited cages set on the ocean floor to catch fish and shellfish. They can be circular, rectangular or conical in shape. The pots may be set out individually or as strings with multiple pots attached to a groundline (See Figure 5-10).

All pots contain entry ports and escape ports that allow undersized or unwanted species to escape. Additionally, all pots must have biodegradable escape panels or fasteners that prevent the pot from continuing to fish if lost.

Strings of pots are marked at each end with a pole and flag, and sometimes a light or radar reflector. Individual pots are marked with surface bouys.

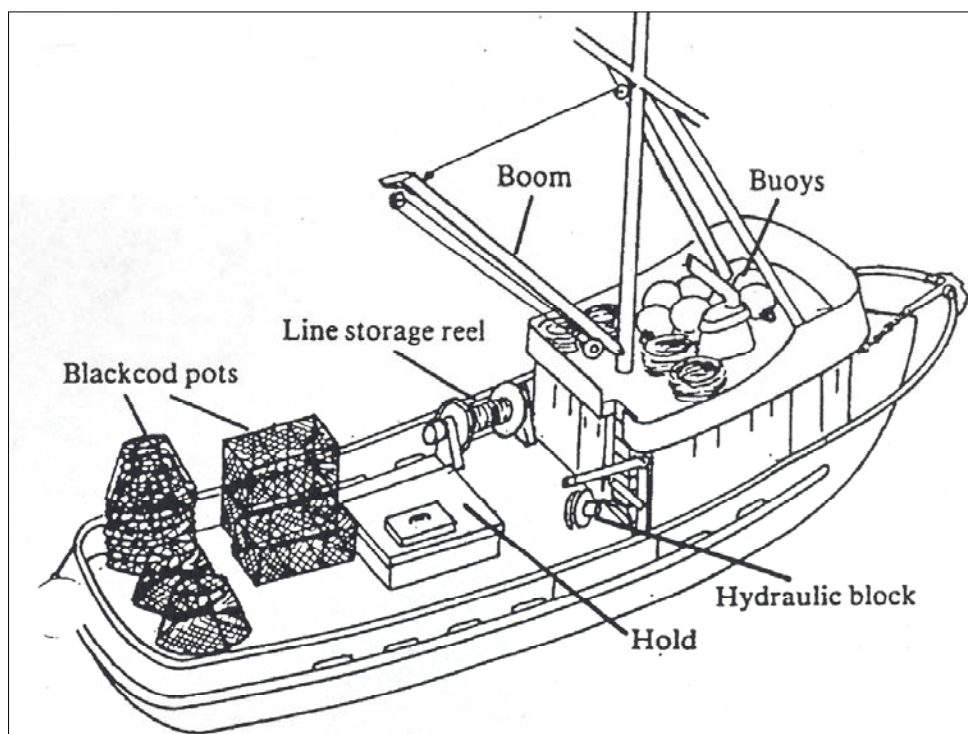


Figure 5 - 10: Trap Vessel



Sablefish Pots

Sablefish pots are fished in strings weighted with anchors at each end and marked at the surface with buoys and flagpoles. The pots are rectangular, trapezoidal, basket, or cylindrical in shape and usually weigh less than 50 pounds (See Figure 5-11). Rectangular and basket-shaped pots have collapsible bottoms so more pots can be stacked on deck. Pots are set and retrieved using line haulers and hydraulic blocks and overhead hoists. Pots are baited with squid, hake, or herring.

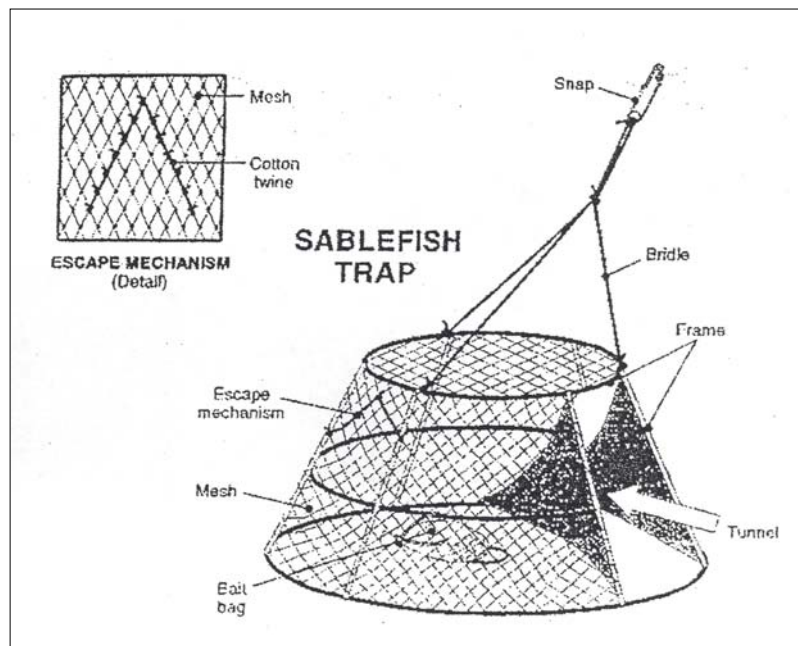


Figure 5 - 11: Sablefish Trap Schematic

Other Groundfish Pots

Pots used in this fishery are often rectangular or conical in shape and are generally constructed of twine meshes on a steel framework (See Figure 5-12). Target species are California sheephead, cabezon, kelp and rock greenling, California scorpion fish, and several species of rockfish.



Figure 5 - 12: Sheephead Trap

Safety Concerns on Fixed Gear Vessels

There are several safety concerns on fixed gear vessels of which Observers should be especially aware. Safety First!!

It may be necessary to sample near the roller station or the block where moving hooks or pots pose a serious threat. It is not uncommon for crewmembers to be seriously injured by incoming and outgoing hooks or pots. If a moving length of line becomes entangled around a leg or an arm, the line can drag a person overboard or into machinery.

While aboard a pot vessel, Observers should be conscious of their surroundings at all times. Be aware of coils of line attaching the buoys to the pot. These are deployed as the pot is launched and have been known to wrap around ankles and drag crew overboard.

Lastly, decks are often awash with water, fish entrails, and whole fish, making them very slippery. In order to reduce the risk of injury, always be conscious of dangers in the immediate area.

Diversity of Fleet and Effects on Sampling

Although the fixed gear fleet is very diverse, sampling protocols are consistent on all hook and line and pot vessels (with the exception of prawn pot). There are, however, a number of vessel characteristics that influence catch sampling. The most important characteristics that affect sampling are:

Fixed gear vessels range in size from kayaks to 70'.

- **Size** – Although the amount of catch on fixed gear vessels is usually small, limited deck space may cause difficulties when sampling. Lack of storage space for catch can affect sample size and often there is not room for a platform scale, making it necessary to rely on hand scales.

Fixed gear vessels land between 50 lbs. and 10,000 lbs. per trip.

Conventional longline gear may or may not have distinguishable gear units. Check with skipper prior to first haul.

Sometimes, weighing retained fish in the live fish and other fisheries is impossible. Tally sample them by species and use landed weights to get a weight per haul.

Total # of Hooks for the Trip Form = The total number of hooks for that set

A grouping of gear can be considered one set if the following are the same:

1. Depth
2. Geographic Area
3. Species
4. Gear Type
5. Date

- **Landing Weight** – The majority of fixed gear vessels participate in the open access portion of the fishery. The open access quota is around 800 lbs. per day. However, there are Limited Entry fixed gear vessels that land thousands of pounds per trip.
- **Gear** – The most important distinguishing characteristics regarding gear is whether or not it has definable smaller units. Gear that has definable smaller units can be randomly subsampled while gear that does not have definable smaller units must be 100% tallied.
- **Live vs. Dead** – Many vessels participate in the live fish fishery. Skippers vary on their willingness to have the Observer weigh live retained fish. In a number of fisheries, including the live fish and dory fleets, discard is frequently released alive. This requires the Observer to be conscientious about not increasing the mortality of discard.
- **Total # of Hooks** – Counting hooks can be tricky. On certain gear types, this means not only counting the number of hooks/skates/poles/tubs/etc. but also counting the number of times each skate/pole/tub/etc. is brought above the waterline.
- **Sets** – Longline gear or strings of pots are easily defined as a set. However, in many of the other fisheries defining a set is difficult. In these fisheries sets are often defined by geographic area, depth, gear type, and species composition. If none of those factors change during a day of fishing, then all gear pulled that day is considered one set.

II. Collecting and Documenting Trip and Total Catch Information

Managers have the same data needs for fixed gear vessels as they do for trawl vessels. Fishing Effort Information including dates, times, locations, etc. are collected by Observers on Fixed Gear vessels and documented on the Trip Form.

Trip Form -Instructions for Completing the Observer Trip Form on Fixed Gear Vessels

An entry must be made for every set a vessel makes while the Observer is aboard. The Trip form is separated into two sections:

- Trip Form – Haul Locations.
- Trip Form – Hauls.

Most of the information on the Trip form (See Figure 5-13 and Figure 5-14) does not require any sampling. The exception is the Observer Total Catch Estimate. Although fixed gear vessels are not required to keep Vessel Logbooks, most skippers will keep a personal log. Ask the skipper to borrow this log to complete the Trip Form. If the vessel does not record its fishing effort information anywhere, the Observer must record this information for themselves. Following the form instructions, procedures for obtaining Observer Total Catch Estimates on fixed gear vessels is discussed.



TIP * It is important for Observers to complete the Trip Form-Haul Locations after each haul.

Trip Form – Haul Locations

- **Fishery Type** – Circle the fishery the vessel was participating in. If the vessel was participating in an EFP fishery, document the name of the EFP in the Trip Notes.
- **Coast Guard Number** – Some Limited entry and open access fixed gear vessels will have a six or seven digit USCG number. **If the vessel does not have a USCG number, leave entry field blank and fill in the State Registration Number field.**
- **Trip Number** – This number is automatically generated by the database system. Complete this field once the trip has started to be entered into the database.



TIP* Some Observers find it easier to start a trip prior to leaving port. Doing this allows the Observer to fill in the Trip Number while at-sea rather than when the Observer returns to port.

- **Observer Name** – Record your first and last name.
- **Year** – Record the year as YYYY.
- **Vessel Name** – Record the full name of the vessel.
- **“Washington-Oregon-California Groundfish Logbook” Number** - This field is left blank on all fixed gear vessels. If the vessel is keeping a Logbook, document the name and page number in the Trip Notes section.
- **Skipper First Name** – Record the first name of the skipper.

- **Skipper Last Name** Record the last name of the skipper.
- **State Registration Number** – Use this field only if the fixed gear vessel does not have a USCG number. The state registration number will begin with a CF in California, OR in Oregon, and WN in Washington.
- **Departure Date/Time** – Document the date and time the vessel left port.
- **Departure Port** – Document the port the vessel departs from.
- **Landing Date/Time** – Document the date and time the vessel returns to port.
- **Landing Port** – Document the port the vessel returns to.
- **Fish Tickets and State Agency Code** – Obtain the numbers of all landing receipts (fish tickets) from the vessel skipper, the port biologist, or the state liaison. **This is a required field for all fisheries and trips!** The state agency code will be C - for California deliveries, O – for Oregon deliveries or W – for Washington deliveries.
- **Trip Notes** – Document any information pertinent to understanding the trip.
- **Haul/Set Number** – Number hauls consecutively, starting with haul 1 for each trip. **Number the hauls in the order they were retrieved, not set!**



Tip * When there is more than one set in the water, pay attention to which set is being hauled (monitor bouys). Vessels often haul gear in a different order than it was set.

- **Start and End Date** – Document the date the haul was set and the date the haul was retrieved as MM/DD.
- **Start and End Time** – Document the Pacific Standard Time (PST) the haul was set and retrieved in 24-hour notation (military time). A haul starts when the first set of bouys is thrown from the vessel or when the first piece of gear goes into the water. The haul ends when the last hook or pot is brought aboard.
- **Start and End Latitude** – Document the location of the first buoy set as the start latitude. Document the location of the final buoy set as the end latitude. Record latitude in degrees, minutes, 1/100th of a minute.
- **Start and End Longitude** - Document the location of the first buoy set as the start longitude. Document the location of the final buoy set as the end longitude. Record longitude in degrees, minutes, 1/100th of a minute.
- **Depth** – Document the fishing depth in fathoms.

Loran

If Observers are on a vessel that is using Loran C, document the Loran coordinates. Send these to the coordinator in an Excel spreadsheet and they will return the latitude and longitude positions.

Fathoms

1 fathom = 6 feet

- **Gear Type** – Enter a code for the gear type based on the configuration of the gear. If the Observer is on a vessel using a type of fixed gear not listed, please contact a Coordinator/Debriefing for instructions.

6 – Longline or Setnet.
7- Vertical Hook and Line Gear.
8 – Pole (Commercial).
9 – Other Hook and Line Gear.
10 – Fish Pot.
15 – All Troll Gear.
16 – All Other Miscellaneous Gear.

****If the vessel is not using one of the above gear types, this is most likely the wrong section of the manual. Please refer to Chapter 4 – Trawl and Prawn Vessels. ****

- **Target Strategy** - Enter the vessel's target strategy. Please refer to Appendix E for a list of target strategies.

LE OA _EFP

USCG #

Trip Number

Vessel Name _____

Logbook # _____

Skipper First Name _____

Skipper Last Name _____

State Registration # (OA only)

Departure Date/Time _____

Departure Port _____

Landing Date/Time _____

Landing Port _____

Fish Tickets

State Agency Code

Trip Notes:

TRIP FORM - HAUL LOCATIONS

Observer name _____ Year _____

Page ____ of ____

Haul/ Set #		DATE		TIME (24-hour clock)	LATITUDE		LONGITUDE		Depth of catch (fathoms)	Gear Type	Target Strategy
		Month	Day		Degrees	Minutes	Degrees	Minutes			
	Start ¹					.		.			
	End ²					.		.			
	Start ¹					.		.			
	End ²					.		.			
	Start ¹					.		.			
	End ²					.		.			
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	Start ¹					.		.			
	End ²					.		.			
	Start ¹					.		.			
	End ²					.		.			

Start¹ - Time the brake is set End² - Time the brake is set

Figure 5 - 13: Trip Form – Haul Locations

Trip Form-Hauls Instructions

- **Haul/Set Number** – Document the haul/set number that corresponds to the Haul Location information on the front of the form.
- **Observer Total Catch Estimate (OTC)** – Record the total catch estimate to two decimal places. Total catch estimate weight is recorded in pounds.
- **Volume of Codend or Trawl Alley/Bin** – This field is blank on fixed gear vessels.
- **Density** – This field is blank on fixed gear vessels.
- **Weight Method** – Enter the number for the weight method used to obtain the Observer Total Catch. The weight methods that may be used for fixed gear are:

11 – Retained + Discard –

When line is 100% tally sampled.

8 – Extrapolation –

When less than 100% of line is tally sampled.

Total Hooks/Pots

Always record the number of pots/hooks set, not retrieved in this column. If gear is lost, use gear performance code 5 and document how much gear is lost in the comments sections.

- **Total Hooks/Pots** – Document the total number of hooks/pots in the set. **Be sure to record the amount of gear set, not retrieved!!**
- **Gear Performance** – Record one of the following codes to document gear performance.
 - 1 - No problem.
 - 2 - Pot was in the haul.
 - 5 - Trawl net or codend lost, pot(s) lost, other gear lost (If pots/hooks have been lost, document in the comments section how many were lost.).

7 – Other problem – Document any other gear related problems in the comments section.

- **Beaufort Scale** – This is not a required field at this time. Do not fill in unless otherwise directed by program staff.
- **Comments** – Document any information that is important about the haul. If the vessel lost gear, document the amount of gear lost in this column.
- **OTC Keypunch Check** – This is required for the Observer Total Catch Estimate field. Add all of the OTC's for an entire trip and record total weight of trip in the OTC keypunch check box (If there is more than one Trip form, add total catches of ALL hauls to obtain keypunch check.).
- **Total Hooks/Pots Keypunch Check** – This is required for the Total Hooks/Pots field. Add all of the Hooks/Pots counts for an entire trip and record total hooks/pots count of trip in the Total Hook/Pot keypunch check box (If there is more than one Haul form, add total hooks/pots counts of ALL hauls to obtain keypunch check.).

TRIP FORM - HAULS

Weight UM: LBS

Volume UM: M³Density UM: LBS/M³

Haul/ Set #	Observer Total Catch Estimate	Volume of Codend or Trawl Alley/Bin	Density	Weight Method	Total Hooks/ Pots	Gear Perf	Beaufort	Comments
Key- punch Check								

Trip Form v. 2
January 2003

Figure 5 - 14: Trip Form – Hauls

OTC on Fixed Gear Vessels

There are only two ways to calculate OTC on fixed gear vessels.

Weight Method 11 – Retained + Discarded

This method is used when 100% of the gear is tally sampled.



$$\text{OTC} = \sum \text{All Catch Categories on Catch Form}$$

Weight Method 8 – Extrapolation

This method is used when less than 100% of the gear is tally sampled.



$$\text{OTC} = \frac{\sum \text{All Catch Category Weights on Catch Form} \times \text{Total \# Hooks in Set}}{\text{Number of Hooks Sampled}}$$

The OTC cannot be calculated on Fixed Gear vessels until the sampling has been completed and is the last calculation made each haul.

Prior to Sampling

Before sampling on a fixed gear vessel Observers must do two things:

1. Define A Set.
2. Determine The Amount Of Gear Fished In Each Set.

Defining A Set

Due to the wide variety of fixed gear types utilized off the West Coast, there are two distinct ways to define a set. The WCGOP Field Manual provides more detailed information on defining sets for specific gear types.

1. Longline and Pot String Sets.

- Gear consists of multiple hooks or pots attached to a groundline. Each end of the groundline is often anchored and is usually marked by a buoy.
- Gear is deployed, soaked and retrieved as a single unit defined as the “set”.
- These sets are usually clearly designated in the skipper’s logbook.
- Limited entry vessels fishing in Oregon and Washington generally fall into this category.

2. Other Line Gear and Pot Sets –

- Line gear consists of single or multiple hooks attached to a line, stick, or rod. Pot gear consists of single pots deployed with a marker bouy.
- Gear is deployed, soaked and retrieved as separate units. Even though the gear is not connected as one unit it is considered a single “set” as long as all the gear meets the following criteria:
 - Gear is the same type.
 - Gear is set the same depth range.
 - Gear is set in the same geographic area.
 - Gear targets the same species.
 - Gear is hauled on the same day.
- These sets are usually NOT designated clearly in a logbook.
- Most vessels fishing in the open access component of the fishery fall into this category.

Determining the Amount of Gear Fished In A Set

The amount of gear in a set is defined as the total number of hooks or pots set. A single hook or pot can be counted multiple times in one set if it is set and retrieved more than once. Observers must determine the total amount of gear used per set for all fixed gear vessels.

Lost Gear

Any lost gear, from a single hook or pot to entire strings, must be accounted for. It is important to determine the amount of gear **set**. OTCs are based on TOTAL HOOKS OR POTS SET, not retrieved!!

Pot Vessels

To determine the amount of gear fished on pot vessels simply count the number of pots the vessel brings aboard and determine if any pots were lost. **If pots are brought aboard multiple times during a single set, count each time they come aboard as a pot.** The only way to get a lost pot count may be to ask the captain.



Total Pots = Sum of All Pots Pulled + Lost Pots

Hook and Line Vessels

Sets on hook and line vessels can be broken down into two categories.

- **“Single Unit” Line Gear** – Has sets with no clearly identifiable gear units.
- **“Multiple Unit” Line Gear** – Has sets with clearly identifiable gear units.

Gear units can take many forms. Three examples of gear units observers are likely to encounter include:

- **Sticks** – Usually a rebar stake with a string of 4 or 5 hooks attached to it. Multiple sticks may be attached to a single line or they may be fished individually.
- **Skates / Tubs** – Sets of longline gear often consist of multiple segments of groundline tied together. These segments are generally referred to as skates or tubs (the line is frequently coiled into plastic tubs for storage). When gear is set, the skates/tubs are tied together. The ‘skate-knots’ that mark the break between two segments of line are generally visible during retrieval and may be used to distinguish individual gear units.
- **Poles** – Standard fishing poles. Usually each pole has two or more hooks.

Skate/Tub gear is the only type of hook and line gear where it may be difficult to determine if a set has multiple units. Differentiating between “single unit” and “multiple unit” line gear is extremely important. In sets of single unit line gear every hook must be sampled. In sets of multiple unit line gear, it may be possible to get an average hook count for the individual gear units so that only a portion of the hooks have to be sampled.

Single Unit Line Gear:

To determine the amount of gear fished in a single unit line gear set, it is necessary to count **all** the hooks.

Since with single unit line gear it is necessary to count all fish caught as well as hooks, it can be extremely difficult to get hook counts during retrieval. If it is necessary to weigh fish during retrieval as well, it can be impossible. There are several options for dealing with this situation. When sampling single unit line gear observers should (in order of preference):

1. Count hooks while they are being baited, while they are stored aboard the vessel, or while the vessel is setting gear.
2. If there are multiple sets of the same length, once a day only count hooks on one set. **DO NOT SAMPLE THIS SET.**
3. Count hooks and tally sample simultaneously during retrieval as best possible. *

*If you are only able to count hooks during retrieval, document in the Observer Logbook the circumstances that required this.

Generally the only way to determine a lost hook count on single unit line gear is to ask the captain how many hooks were lost. If hooks were counted during the retrieval, add the number of lost hooks to the tallied hooks to obtain the total number of hooks.



Total Hooks = All Hooks Set

Multiple Unit Line Gear:

In multiple unit line gear, a set is composed of a number of individual gear units. To determine the amount of gear fished in a multiple unit line gear set, two pieces of information must be obtained.

1. The average number of hooks per gear unit.
2. The total number of gear units.

Average Number of Hooks:

Vessels generally have a consistent number of hooks per gear unit. Determining the average number of hooks per gear unit is a two-step process.

1. Determine the total number of gear units the vessel is using. This information can be obtained from the Captain or a crewmember.
2. Count the number of hooks per gear unit on **1/5** of the gear being used each trip. It is usually easiest to count hooks while they are being baited or while the gear is being set. Always document in the Observer Logbook when average hook counts were done and why that time was chosen.



$$\text{Avg. Hooks per Gear Unit} = \frac{\text{Sum of Counted Hooks}}{\text{\# Gear Units Counted}}$$

Number of Gear Units:

Determining the total number of hooks in a set is easier for some gear types than for others. The following section addresses typical methods for determining the total number of hooks for the three gear types (sticks, skates/tubs, and poles). Although all gear types are not specifically mentioned here, these methods can be utilized on all the gear types Observers will encounter. Refer to the field manual for specifics on the appropriate method for each gear type.

- **Sticks** – Many vessels fishing with stick gear will use each stick many times during one set. Each stick is easily identifiable and gear is pulled slowly enough to count every time a stick is retrieved. It may be possible to keep track of lost sticks during retrieval as well. If not, get a lost hook count from the captain or crew. To determine the total number of hooks in a set:

1. Count every time a stick is brought out of the water.

2. Count the number of lost sticks.
3. Add the retrieved stick count to the lost stick count to get the total number of sticks fished.
4. Multiply the total number of sticks by the average hook count.



$$\text{Total Hook Count} = (\text{Total Sticks}) \times (\text{Ave. Hooks per Stick})$$

- **Skates/Tubs** - Skate or tub gear is fished with multiple skates tied together, not as individual units. It can be difficult to distinguish between individual skates during retrieval. If it is not possible to get accurate counts, it is acceptable to ask the captain how much gear was set and use his numbers. However, when using a captain's numbers, Observers are required to do an independent verification of skate counts for one haul each day. This is accomplished by counting skates during one of the following times:

- While the gear is being set.
- After a set is completed and gear is all on board.
- While gear is being brought aboard.

To determine the total number of hooks in a set:

1. Count the number of skates hauled.
2. Count the number of lost skates.
3. Add the retrieved skate count to the lost skate count to get the total number of skates fished.
4. Multiply the total number of skates by the average hook count.



$$\text{Total Hook Count} = (\text{Total Skates}) \times (\text{Ave. Hooks per Skate})$$

- **Poles** - Vessels fishing with poles (rod and reel) generally fish multiple poles at once and gear is retrieved and set numerous times in a rapid fashion. The rate at which gear is retrieved and reset can make it extremely difficult to keep an accurate count of the total number of hooks set. If it is not possible to count all retrievals of every hook, use the following procedure to calculate a total number of hooks for a set:

1. Estimate the number of hours the vessel will be fishing that day.
2. Divide the number of hours into small units. The number of hooks retrieved must be counted during at least **1/6** of the estimated time.
3. Apply a random systematic sampling frame to select time units during which the number of hooks retrieved will be counted.
4. During selected time units, count the number of hooks retrieved. It should be possible to continue to tally fish while counting hooks but it may be impossible to weigh the fish.
5. Accurately record the actual amount of time the vessel fished.
6. Multiply the number of hooks counted by the total fishing time then divide by time spent counting hooks to get the total number of hooks.



$$\text{Total Hook Count} = \frac{(\# \text{ of Hooks Counted}) \times (\text{Total Fishing Time})}{\text{Time Spent Counting Hooks}}$$

Vessels Where Hook Counts Are Impossible to Obtain

There are a few vessels in Southern California fishing longline gear on which it is impossible for Observers to verify hook counts. The following circumstances combine to make counting hooks impossible:

1. All hooks must be tallied. This can be for any either of two reasons:
 - Single unit longline gear is being fished.
 - The skate knots marking the break between gear units are not readily discernable during gear retrieval.
2. The number of hooks per gear unit is extremely variable. This makes it impossible to use average hook counts to calculate a total hook count.
3. Vessel is retaining fish alive and discarding live fish so the Observer must weigh fish during the retrieval.
4. Gear is baited at an alternate location. Many fishers pay to have their gear baited. After a trip, they give their gear to the baiters who take it to a shop and bait it there. When the gear is returned, it's ready to be set.

To determine the number of hooks per skate on these vessels:

1. Ask the skipper after EACH skate/tub how many hooks were on that specific skate/tub.
2. Ask the skipper after EACH haul how many hooks were hauled. This is a way to double-check that the skate counts are correct. If there is a large discrepancy between the count the

skipper gave you for EACH skate/tub and the count for the haul, interview the skipper further about why this discrepancy took place.

Refer to the WCGOP Field Manual for more information regarding this method.

III. Collecting and Documenting Catch Category Weight

On fixed gear vessels, Observers must sample both retained and discarded catch. Since fish come up individually (on line vessels) or in relatively small quantities (on pot vessels), sampling on fixed gear vessels is relatively easy compared to sampling on trawlers.

The Observer may or may not be able to monitor the entire fixed gear set. When multiple unit line gear or strings of pots are hauled there are two distinct sampling periods: the tally and non-tally periods. Tally sampling on fixed gear vessels is conducted as the gear is being retrieved. When tallying on a line vessel, the Observer counts everything that comes up on the line, including drop offs, during randomly chosen gear segments or time periods. When tallying on a pot vessel, the Observer counts all the individuals that are in randomly selected pots.

Non-tally periods refer to the segments of gear or periods of time when the Observer is not counting individuals and gear is being retrieved. The non-tally period on line vessels is used for weighing organisms, measuring retained and discarded species, assessing injuries of Pacific halibut, and performing other duties. On pot vessels, the Observer can often weigh the fish from the sampled pot while the next pot is brought aboard. During “off” pots, the Observer can complete the biological sampling or other duties.



Tip* Vessels using single unit longline gear, sticks, poles, or single pots are, generally, 100% tally sampled. Weighing of fish and biological sampling is done in conjunction with tally sampling.

Catch Categories on Fixed Gear Vessels

The same 2 rules apply for catch categories on fixed gear vessels as trawlers and prawn vessels.

- Retained and Discarded species must be in separate catch categories.
- Pacific halibut is always in its own catch category.

Sampling Catch Categories

“# Of Hooks/Pots Sampled” on the Fixed Gear Catch Form should be the same for ALL catch categories!!

Retained and discarded catch is tally sampled on fixed gear vessels. Tally sampling is done by counting each individual that comes up by species. **Always tally the same number of hooks or pots for retained and discarded species.**

Where to Tally Sample

The tally station is where the Observer stands to count organisms as the groundline or pot is being retrieved. The tally station should be no more than six meters from where the fish are landed and the Observer should have a clear line of sight to the fish as they coming aboard. From the tally station, Observers must be able to clearly identify fish as they come aboard and identify drop-offs.

Equipment Needed

Three to six thumb counters and a clipboard will be needed. Prior Observers have devised many innovative techniques to make using multiple thumb counters easier. The most common is to use duct tape to attach multiple thumb counters to a clipboard. Other Observers have used duct tape and line to create thumb counter belts that fit

around the waist. Observers should be creative, experiment, and find out what works best.

When tally sampling, all individuals should be recorded to species. Some species are similar in appearance so it may not be possible to distinguish them to species. Examples of these are Rougheye and Shortraker rockfish or Shortspine and Longspine thornyheads. It is acceptable to tally these species to mixed groups such as Rougheye/Shortraker and Shortspine/Longspine.

Tally Random Sampling Methods

There are three types of random sampling on fixed gear vessels, spatial, systematic, and temporal. In all three types of longline sampling, begin sampling on a skate knot.

In the explanations below all the gear subunits (skates, pots or poles) are generically referred to as “skates”.

Systematic Sampling (preferred)

Fixed-gear vessels routinely set over of a depth gradient or across different bottom types. This means the catch can vary significantly along a set. The best way to account for the variability caused by setting across a depth gradient or different bottom types is to use a systematic spatial random sampling frame. The procedure for systematic spatial sampling is as follows:

1. Verify how many skates are in the set.
2. Decide how many skates to sample, making sure to sample at least **1/3** of the set.
3. Break the set into sampling segments (n) by dividing the total number of skates by the number of skates that will be sampled. For example, there are 12

skates total and 4 skates are going to be sampled resulting in a sampling unit of 3 ($12/4 = 3$).

4. Choose which skate to start sampling from by selecting a random number that is between 1 and the sample unit (n).
5. Tally sample the randomly selected starting skate then tally sample every n^{th} skate after that.

Example of Systematic Sampling

1. The Observer on the Blue Dragon verifies with the skipper that 30 pots have been set.
2. The Observer decides to sample $1/3$ of the pots set.
3. The Observer calculates the number of sampling units by dividing the total pots by the sample size ($30 \text{ total pots} / 10 \text{ pots} = 3 \text{ units}$).
4. The Observer puts pieces of paper with the numbers 1, 2, and 3 into a hat and randomly selects the paper with the number 2.
5. The Observer begins tally sampling with pot 2 then samples every third pot after that. Pots 2, 5, 8, 11, 13 etc. are tally sampled by the Observer.

Spatial Sampling

Spatial sampling is gear-based and involves randomly selecting a portion of skates from the overall set to sample. The procedure for spatial sampling is as follows:

1. Verify how many skates are in the set.

2. Decide how many skates to sample making sure to sample at least **1/3** of the set.
3. Choose which skates to sample by selecting a set of random numbers. For example, there are 10 skates and the numbers 2, 5, 7, and 8 are drawn from a hat to select the skates to sample.
4. Tally sample the randomly selected skates.

Example of Spatial Sampling

1. The Observer on the Tiny Tim verifies that 10 pieces of rebar with hooks have been set in a small bay.
2. The Observer decides to sample about $\frac{3}{4}$ of the total gear set.
3. The Observer uses a random number table to select rebars 1, 2, 4, 5, 6, 7 and 9 to sample.
4. The Observer tally samples the randomly selected rebar gear.

Temporal Sampling

Temporal sampling is time based, therefore, the length of time it will take to haul a set must be known. The procedure for temporal sampling is as follows:

1. Verify the length of time needed to haul the set by asking the skipper or a crewmember.
2. Decide how much of the set to sample making sure to sample at least **1/3** of the total hauling time for the set.

3. Break the set into reasonable sampling time periods. For example, break a 4-hour hauling time into 30-minute sampling periods.
4. Choose which time periods to sample by selecting a set of random numbers. For example, there are 8 time periods and the numbers 2, 5, and 8 are drawn from a hat to select the time periods to sample during.
5. Tally sample the first skate that begins in each of the randomly selected time periods. Always start the sample on a skate knot! Never start sampling in the middle of a skate regardless of the timing.
6. If the crew is in the middle of hauling a skate when a sampling time frame occurs, wait until the end of that skate to start sampling. Sample for the entire time period. If the vessel is in the middle of a skate when the time period ends, continue to tally sample until the entire skate is on board!

Example of Temporal Sampling

1. The skipper on the Miss Fish tells the Observer that it will take about 3 hours to haul the longline set.
2. The Observer wants to sample $\frac{1}{2}$ the set.
3. The Observer decides to break the set into 30-minute blocks of time, which results in a total of 6 sampling periods ($180 \text{ min} / 30 \text{ min} = 6$).
4. Since the Observer wants to sample $\frac{1}{2}$ the set, he randomly selects 3 of the 6 sampling periods to sample during. Sampling periods 2, 3 and 6 are selected by randomly drawing cards from a hat.

5. When sampling period 2 begins (60 minutes after hauling starts), the Observer looks for the first skate knot to come up and begins tally sampling at that first skate knot, continuing until sampling time has elapsed and the final skate is fully sampled.
6. The Observer then waits for sampling period 4 to begin (90 minutes after hauling starts) looks for the first skate knot to come up and begins tally sampling at that first skate knot, continuing until sampling time has elapsed and the final skate is fully sampled.
7. The Observer continues in this fashion for each of the selected sampling periods.

Weighing Species on Fixed Gear Vessels

On many fixed gear vessels, it is possible to weigh the entire discard collected during a tally sample. However, in most cases average weights will need to be used for retained species. There are two options for collecting individuals for average weights:

- **During tally period** – The preferred method is to collect individuals during the observed tally period. When individuals are collected during the tally period, it ensures that all the species needed to obtain average weights are present. Collect and weigh at minimum 15 individuals of each non-targeted species and 50 individuals of the targeted species. **
- **During non-tally period** –The major problem with collecting individuals during the non-tally period is that all species in the tally sample may not be represented. If this happens, visually estimate species weights or use “like sets” to arrive at an average weight. Collect and weigh at minimum 15

individuals of each non-targeted species and 50 individuals of the targeted species. **

**Fixed gear vessels that day fish may not catch more than 50 of the targeted species. On a vessel that catches only limited numbers of targeted species, devise a random systematic frame and collect retained individuals for weights throughout the set(s). At least 15 individuals should always be used for average weights.

Random Sampling when Collecting Individuals for Average Weights

There are two methods to use on a fixed gear vessel to randomly collect individuals for average weight determinations. These two methods, spatial and systematic sampling, are detailed below.

In the explanations below all the gear subunits (skates, pots or poles) are generically referred to as “skates”.

Spatial Sampling

Spatial sampling is a good method to use for species caught in **small** quantities.

1. Select skates to use for collecting individuals using one of the following two methods:
 - Select all non-tally sampled skates.
 - Randomly select one or more skates from the entire set.
2. Collect all individuals.
3. Weigh the collected individuals for average weight determinations.

Example of Spatial Sampling

1. The Blue Dragon sets 20 pots.
2. The Observer on the Blue Dragon randomly selects 13 of the 20 pots to tally sample by pulling numbers out of a hat.
3. The Observer uses the remaining 7 pots to collect and weigh individuals for average weight determinations.

Systematic Sampling

Systematic sampling is a good method to use for species caught in **large** quantities and **live fish** fisheries.

1. Select skates to use for collecting individuals using one of the following two methods:
 - Select all non-tally sampled skates.
 - Randomly select one or more skates from the entire set.
2. Systematically collect a portion of the total number of individuals.
 - Estimate the total number of individuals that will be caught in the sampling frame.
 - Divide the estimated total individuals by the number of fish needed (at least 15) to determine the collection frequency (n).
 - Collect every n^{th} individual.
3. Weigh the collected individuals for average weight determinations.

Example of Systematic Sampling

1. The Miss Fish sets a line with 10 skates.
2. The Observer on the Miss Fish randomly selects skate 2 to sample by selecting a number from a random number table.
3. The Observer estimates that 100 sablefish will be caught in skate 2.
4. The Observer wants to collect 20 sablefish to use for an average weight determination.
5. The Observer determines the frequency to collect sablefish by dividing 100 by 20 to get a collection frequency of 5.
6. Starting at the beginning of skate 2, the Observer collects every 5th sablefish until a total of 20 sablefish have been collected.
7. The Observer weighs the 20 sablefish and uses the subsample weight to calculate the average sablefish weight.

Average Weight Calculations

On Fixed Gear vessels, all species in the tally sample MUST have an actual count. However, not all individuals need to be weighed. For some species, an average weight calculation can be applied.



$$\text{Total Sample Wt.} = \frac{\text{Wt. of subsample}}{\text{\# In subsample}} \times \text{Total \# in Tally Sample}$$



Tip* When doing an average weight calculation, count and weigh as many individuals as possible. At minimum, 15 individuals should be weighed and counted. For species that are caught in large quantities, count and weigh at least 50 individuals.

Using Delivery Weights for Average Weights of Talled Individuals

Because fishers participating in the live fish market are extremely concerned about the condition of their fish, collecting retained individuals may not be possible. Observers can use delivery weights (fish tickets) to calculate the average weight of species on these vessels.

1. Tally ALL retained individuals by species for every haul.
2. Observe the weighing of the fish by species upon landing, if possible. If not, ask the skipper for a copy or look at the weights on the fish ticket.
3. Calculate average weight of species by:



$$\text{Avg. Species Weight} = \frac{\text{Landing weight of species (lbs)}}{\text{\# Of individuals of species caught during ENTIRE trip}}$$

4. For each haul, calculate the weight of retained species.



$$\text{Species Wt by Haul} = \text{Avg. Species Wt} \times \text{\# of individuals caught in haul}$$



Tip* Any time average weight calculations are used to determine a species weight, sample method 4 – Fixed Gear Sample should be used on the Species Composition Form. This can be confusing when delivery weights are used because all the fish for the trip are weighed. However, Sample Method 1 – Whole Haul refers to a haul

specific weighing of fish, which is not done in this case.

Weight Methods Applicable for Catch Categories on Fixed Gear Vessels

There are only four weight methods that can be used for catch categories on Fixed Gear Vessels. They are:

Weight method 13 – Tally Sample

Weight method 4 – Visual Estimate

Weight method 6 – Other

Weight method 9 – Pacific Halibut Length/Weight

Remember, no matter what weight method is used, actual counts must be obtained for all individuals in the sample.

Weight Method 13 – Tally Sample

This weight method is used for species that are counted AND an actual or extrapolated weight has been obtained.

Weight Method 4 – Visual Estimate

This weight method is used for species that have a count but ONLY a visual weight.

For example: Large skates will usually break the gangions when they leave the water. This means the Observer will not be able to get a weight for large skates and using an average weight from smaller skates would be biased. Therefore, taking a visual estimate of the weight is the best option.

Weight Method 6 – Other

This weight method should never be intentionally used. It creates confusion for end users and debriefers because it does not give an idea how the total catch was actually derived. If this method is used, document what happened in the Observer Logbook and on the paperwork.

Weight Method 9 – Pacific Halibut Length/Weight

This weight method is ONLY used for Pacific Halibut. Actual lengths or visually estimated lengths can be used.

Pacific Halibut

The International Pacific Halibut Commission (IPHC) manages the Pacific Halibut fishery. The IPHC sets the total allowable catch of Pacific halibut for both the United States and Canada. Pacific halibut (See Figure 5-15) are a prohibited species in most of the fisheries off Washington, Oregon, and California. It is illegal to retain Pacific Halibut on any vessel fishing in the waters off Washington, Oregon, and California unless:

- The vessel is participating the Limited Entry Sablefish fishery.
- The vessel is participating in a Pacific Halibut opener. These openers usually last only a day or two.



Figure 5 - 15: Pacific Halibut

Pacific Halibut in the Composition Sample

Pacific halibut are tallied at the same time as all other species but the method used for determining their weight is often different than for any other species. Pacific halibut are often too large to obtain an accurate weight with the scales provided and large individuals may not be brought on board the vessel at all. If the fish are small enough to weigh, it is preferred that individuals be collected for an average weight sample and applied to the tallied number. For situations where this is not possible, the IPHC has developed a length to weight table that lists approximate weights of Pacific halibut based on the length in centimeters (see Appendix J). It is acceptable to estimate the weight of Pacific Halibut in tally samples using this table. If actual lengths cannot be obtained, it is permissible to use visually estimated lengths.

The following suggestions will help with estimating the length of Pacific Halibut (See Figure 5-16):

- Measure the distance from the roller to weld marks on the side of the vessel or the waterline, if weather permits.
- Measure the distance between the gangions on the groundline and measure the length of the gangions themselves. On most longline vessels, the distance between the gangions and the length of the gangions are consistent. Under normal operations the Observer will be able to see the fish being pulled by the groundline and gangion. Estimate the length of the Pacific Halibut in reference to the length of groundline between the gangions or the length of the gangion itself.
- Use the length of the gaff or the pole gaff to compare to the lengths of the Pacific Halibut.

- Pre-measure the length of the longline trough, some Pacific Halibut will be brought on board either to be retained or by accident, having several marked measurements in the trough will allow the Observer to quickly estimate the length of any landed Pacific Halibut.

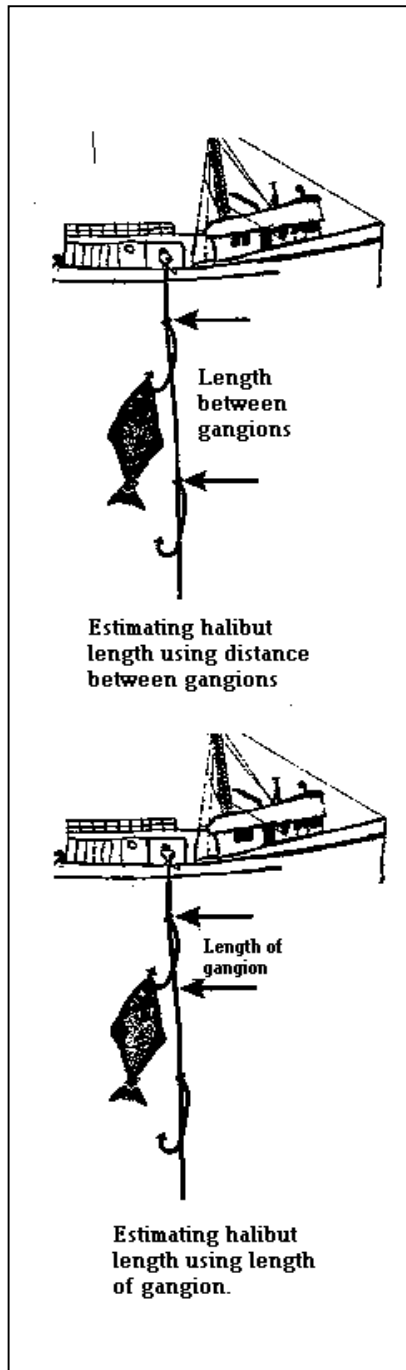


Figure 5 - 16: Visuals Length Estimates of Pacific Halibut

Unsampled Sets

Every set retrieved during a trip **MUST** have an OTC, even if it has not been sampled. For sets that are not sampled, employ a “sum of like sets” to determine OTC. Using a “sum of like sets” provides an estimation of catch based on sets from similar areas, depths, and times.

Never use the vessel’s estimate for OTC on a longliner.

When estimating the OTC for an unsampled set, use more than one “like set” for the calculation. “Like sets” should be close in proximity, at the same depth, and of similar soak time as the unsampled set. In most circumstances, Observers will be able to use the sets just before and after their unsampled set. The lengths of the set or the number of hooks in the comparison sets do not need to be similar for the calculation of “like sets.”



$$\text{OTC of Unsampled set} = \frac{\text{Total wt of “like” set A} + \text{total wt of “like” set B}}{\text{Total \# of hooks in set A} + \text{total \# of hooks in set B}} \times \text{\# hooks unsampled set}$$

Fixed Gear Catch Form Instructions

The Fixed Gear Catch Form (See Figure 5-17) is used to document sample weight and other catch information. A Catch Form should be completed for all hauls.



TIP* The “weight” column is filled out differently on Fixed Gear Catch Form than on the Trawl/Prawn Catch Form.

- **Haul Number** – Record the number of the haul.
- **Date** – Record the date as MM/DD/YY.
- **Trip Number** – Record the trip number generated by the database system.
- **Coast Guard Number** – Record the six or seven digit USCG vessel number if the vessel has one. **If the vessel does not have a USCG number, leave entry field blank.**
- **Catch #** - Number the catch categories consecutively, starting from 1 for each haul. The numbers on the paper Catch Form must match the numbers assigned by the database when data is entered.
- **R or D** – Record whether the catch category is from retained or discarded catch. Record with an R – Retained or D – Discarded.
- **Catch Category** – Record the catch category in capital letter using the 4-letter PacFin code. For a list of PacFin catch category codes, see Appendix E
- **Sample Weight** – Record the weight of the **tally sample** for the catch category in pounds.

- **Numbers of Fish – You MUST record** the total number of fish in the catch category if the Weight Method 4 – Visual Estimate or Weight Method 9 – Length/Weight conversion is used. Do not record the number of fish for weight method 13 – Tally Sample.
- **Hooks/Pots Sampled** – Record the number of hooks or pots tally sampled.
- **Weight Method** – Document the weight method used to estimate the catch category.

4-Visual Estimate.

6-Other

9-Length/Weight Conversion
(Pacific Halibut only).

13 – Tally sample.

- **Catch Purity** – Record as P – Pure if the catch category is 95% or greater a single species or as M – Mixed if the catch category is less than 95% a single species.
- **Discard Reason** – Record the skippers/crews reason for discard for unsampled (no species composition sample taken) discarded catch categories only.

1-Prohibited – Only Salmon, Pacific Halibut, and Dungeness crab.

2-Size –High-graded fish.

3-Market – Any market driven reason such as size (too big or small), no market, market price is too low, etc.



TIP* Species which are unlikely to be retained, such as eelpouts, sculpins, and grenadiers are given a reason for discard of “3”.

4-Regulation – Any regulatory reason including size, over quota, etc.

5-Other – Document in comments actual reason for discard.



Tip* As a rule, invertebrates such as starfish, anemones, and sea pens are given a reason for discard of “5”.

6-Drop-off – Any fish that would have been retained if it was landed. (Fish did not make it on boat because it fell off the line)

7-Predation – Any fish that would have been retained but was eaten by a predator;; such as a marine mammal, seabird, or sand fleas.



Tip* Look only at the primary reason for discard. For instance, if the vessel is not retaining Starry Flounder and one drops-off, do not record the reason of discard as drop-off. Even if it had made it on the vessel, the fish would not have been retained. This also applies to predated fish that drop-off. If a fish that would have been retained drops off because it's been predated, the reason for discard should be predation. (Even the fish made it

aboard it would not have been retained due to predation.)

- **Vessel Estimate** – This column is blank on fixed gear vessels.
- **Comments** – Document anything important about each category.
- **Keypunch Checks** – These are required field for Sample Weight, Numbers of fish, and Numbers of Hooks/Pots columns. Sum up the entries in each column and place the total in the corresponding keypunch box at the bottom of the form.

Figure 5 - 17: Fixed Gear Catch Form

IV. Collecting and Documenting Species Composition

Sample Methods when Tally Sampling

On fixed gear vessels, only catch categories with *Weight Method* 13 – Tally Sample will have a species composition.

Method for Species Composition Sampling

There are two sample methods for species composition sampling on fixed gear vessels.

- ***Sample Method 1 – Whole Haul***

If the Observer weighed 100% of the individuals in the catch category, Sample Method 1 – Whole Haul is used.

- ***Sample Method 4 – Fixed Gear Sample***

If less than 100% of the individuals in the catch category are weighed, Sample Method 4 – fixed gear sample is used.

IMPORTANT!!

Discarded and retained individuals are always in separate catch categories. Within either the discarded or retained portion of the tally sample:

- If **every** individual is weighted then all species are placed in one catch category and the sample method on the Species Composition Form is 1 – Whole Haul.
- If there are individuals where weights must be visually estimated or Pacific halibut for which length/weight conversions are done, these individuals are placed in their own catch categories and **are not** recorded on the Species Composition Form.

- If only a portion of the individuals of **any** species are weighed (i.e. only 5 of 10 skates are weighed) and an average weight is used to calculate total weight of skates in the sample then all species for which actual or extrapolated sample weights have been obtained are placed in the same catch category and the Sample Method on the Species Composition Form is 4 – Fixed Gear Sample.

Species Composition Form Instructions

The species composition information collected is record on the Species Composition Form (See Figure 5-18).

- **Haul Number** – Record the number of the haul that the sample came from.
- **Date** – Record the date as MM/DD/YY.
- **Trip Number** – Record the trip number generated by the database system.
- **Coast Guard Number** – Record the six or seven digit USCG vessel number if the vessel has one. **If the vessel does not have a USCG number, leave entry field blank.**
- **Catch #** - Record the number that corresponds to the catch category on the Catch Form.
- **Sample Method** – Record the method used to sample the catch category.

1 – Whole haul.

4 – Fixed Gear.

- **# Of Baskets** – This field is blank on fixed gear vessels.

- **Catch Category** – Record in capitol letters the catch category sampled using the 4-Letter PacFin code.
- **KP Weight and KP Number** – Sum up the total weight of all species in the catch category sample and place the total weight in the Keypunch (KP) Weight box. Sum up the total number of all species in the catch category sample and place the total number in the Keypunch (KP) Number box.



Tip* Check to be sure the KP Weight on the Species Composition form is the same as the Catch Category Sample Weight on the Catch Form!! (If not, there is a problem).

- **R or D** – Record whether the catch category sampled was **R** – Retained or **D** – Discarded.
- **Species** – Record the common name of the species in the sample. This column must be filled in with the species name. Do not simply enter the species code! The common name listed on the paperwork must match the common name used in the database. See Appendix A - D for a list of species.
- **Species Code** – Record the species code number of the corresponding species. This can be done prior to entering and not on deck. See Appendix A - D for a list of species and species codes.
- **Sample Weight** – Record the total weight of the species in the sample (can be extrapolated).
- **Fish Number** – Record the number of fish of each species in the sample (Can NOT be extrapolated).

- **Reason for Discard** – Record the skipper’s/crew’s reason of discard for each discarded species.

1-Prohibited – Only Salmon, Pacific Halibut, and Dungeness crab.

2-Size – High-graded fish.

3-Market – Any market driven reason such as size (too big or small), no market, market price is too low, etc.



Tip* Species which are unlikely to be retained, such as eelpouts, sculpins, and grenadiers are given a reason for discard of “3”.

4-Regulation – Any regulatory reason including size, over quota, etc.

5-Other – Document in comments actual reason for discard.



Tip* As a rule, invertebrates such as starfish, anemones, and sea pens are given a reason for discard of “5”.

6-Drop-off – Any fish that would have been retained if it was landed (fish did not make it on boat because it fell off the line).

7-Predation – Any fish that would have been retained but was eaten by a predator; such as a marine mammal, seabird, or sand fleas.



Tip* Look only at the primary reason for discard. For instance, if the vessel is not retaining Starry Flounder and one drops-off, do not record the reason of discard as drop-off. Even if

it had made it on the vessel, the fish would not have been retained. This also applies to predated fish that drop-off. If a fish that would have been retained drops off because it's been predated, the reason for discard should be predation (even the fish made it aboard it would not have been retained due to predation.).

- **Basket Weight and Number** – Use this column on deck for species with multiple weights. These columns are not required. Be sure to fill the “Sample Weight” column in with the total weight of the species in the sample only!

Species Composition Form v.3
January 2004

Figure 5 - 18: Species Composition Form

Discard That Cannot Be Attributed to a Specific Haul

On rare occasions, a vessel will discard fish from the hold. This happens if market conditions change during a trip or if they are catching larger fish that are worth more money. Record discard that cannot be attributed to a specific haul on the Trip Discard Form.

Trip Discard Form Instructions

The Trip Discard Form is not entered into the database system. Document the information from the Trip Discard Form (See Figure 5-19) in the Trip Comments on the Trip Page.

- **Trip Number** – Record the trip number generated by the database system.
- **Coast Guard Number** – Record the six or seven digit USCG vessel number if the vessel has one. **If the vessel does not have a USCG number, leave entry field blank.**
- **Date** – Document the month and day that the trip discard took place.
- **Time** – Document the time, in Pacific Standard Time, that the trip discard took place.
- **Species** – Document the species that was discarded.
- **Weight** – Document the weight, in pounds, of species discarded.
- **# of Fish** – Document the number of fish discarded.

- **Weight Method** - Document the weight method used to estimate the species weight.

1-Actual Weight

2-Bin/Trawl Alley Estimate

3-Basket Volume Determination

4-Visual Estimate

5-OTC-Retained

6-Other

7-Vessel Estimate

8-Extrapolation

- **Discard Reason** - Record the skipper's/crew's reason of discard for each species.

1-Prohibited – Only Salmon, Pacific Halibut, and Dungeness crab.

2-Size – High-graded fish.

3-Market – Any market driven reason such as size (too big or small), no market, market price is too low to retain.

4-Regulation – Any regulatory reason including size, over quota, etc.

5-Other – Document in comments actual reason for discard.

7 – Predation – Caught fish that are eaten by any predator including marine mammals, seabirds, or sand fleas.

- **Comments** – Document any additional information that is important.

Trip Discard Form

Page ____ of ____

Trip Number

USCG #

Date		Time	Species	Weight	# of Fish	Weight Method	Discard Reason	Comments
Month	Day							

Trip Discard Form v.2 January 2004

Figure 5 - 19: Trip Discard Form

V. Examples

Longline Example

Official Total Catch Calculations

Gear Units
Sampled

15

Average Soak
Time/Gear Unit:

N/A

hooks/gear unit:

136

Retained

7 @ 57.82 lbs
8 @ 71.96 lbs
10 @ 86.91 lbs
6 @ 53.84 lbs
8 @ 61.43 lbs
8 @ 72.34 lbs
7 @ 52.16 lbs

562

Sable

Discarded

(Drop-off)

Arrowtooth

|||||

15 @ 77.0lbs
(Market)

Starfish

|||||

11 @ 10.23 lbs

14 @ 55.0

|||||

Red-Banded

||

(Drop-off)

Spiny Dog

51

15 @ 60.74 lbs
(Market)

2 @ 5.5lbs

|||

Shortspine

|||

(Drop-off)

Skate
(Visual)

40	30	20
60	20	50
40	45	30
40	20	30

(Market)

P. halibut
(visual
length)

30	
40	
50	
60	I
80	
100	
110	

Total Hooks in Set = 15 skates X 136 Hooks = 2040 Hooks
Skate

OTC = Retained + Discarded = 4813.82 lbs + 359.74 lbs + 406.87 lbs + 425 lbs = 6005.43 lbs

Haul #

0	1
---	---

FIXED GEAR CATCH FORM*

Page 1 of 2

Date	<table border="1"><tr><td>0</td><td>8</td><td>2</td><td>3</td><td>0</td><td>2</td></tr></table>	0	8	2	3	0	2	Trip Number	<table border="1"><tr><td></td><td></td><td>1</td><td>7</td><td>6</td></tr></table>			1	7	6	USCG #	<table border="1"><tr><td>1</td><td>0</td><td>6</td><td>8</td><td>3</td><td>6</td><td>1</td></tr></table>	1	0	6	8	3	6	1
0	8	2	3	0	2																		
		1	7	6																			
1	0	6	8	3	6	1																	

Catch #	R or D	Catch Category	Sample Weight	#s of Fish Req. for wt. methods 4, 6, 9	# Hooks/Pots sampled by catch category	Weight Method	Catch Purity	Discard Reason	Vessel Estimate	Comments
1	R	ZMIS	4813.82		2040	13	M			
2	D	ZMIS	359.74			13	M			
3	D	PHLB	406.87	41		9	P	1		
4	D	SKAT	425	12	2040	4	P	3		
Keypunch Checks			6005.43	53	8160					

*Gear Types 6, 7, 8, 9, 10, 15, 16

January 2004

Fixed Gear Catch Form v. 4

Haul #	0	1
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Page 2 of 2

Date	0	8	2	3	0	2
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Trip Number			1	7	6
-------------	--	--	---	---	---

USCG #	1	0	6	8	3	6	1
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Method : 1-Whole haul species 2-Single basket 3-Multiple basket 4-Fixed Gear Sample
Reason for discard: 1-Prohibited 2-Size 3-Market 4-Regulation 5-Other 6-Drop-off 7 - Predation

Species Composition Form v.3
January 2004

Species Composition Measurements and Calculations

R or D	Catch Category	Density Samples	Measurements, Formulas, and Calculations	Total Weight
R	ZMIS 1		Sablefish Aver Weights $\frac{456.46 \text{ lbs}}{54 \text{ fish}} = 8.452962962 \text{ lbs/fish}$ SABL wt - 562 fish X $\frac{8.452962962 \text{ lbs}}{\text{fish}} = 4750.565184 \text{ lbs}$ Shortspine Thornyhead Ave Wts $\frac{5.5 \text{ lbs}}{2 \text{ fish}} = 2.75 \text{ lbs/fish}$ SSPN wt = 3 fish X 2.75lbs/fish = 8.25 lbs	SABL 562 @ 4750.57 SSPN 3 @ 8.25
D	ZMIS 2		SABL weight (use retained ave wt) $8.452962962 \text{ lbs/ fish} \times 1 \text{ fish} = 8.452962962 \text{ lbs}$ Arrowtooth Ave Wt $\frac{77.00 \text{ lbs}}{15 \text{ fish}} = 5.133333333 \text{ lbs/fish}$ ARTH wt = 22 fish X 5.133333333 lbs/fish = 112.9333333 lbs	SABL 1 @ 8.45 ARTH 22 @ 112.93 Redband 2 @ 7.86
			Redbanded RF weight (use retained ave wt) $\frac{55.0 \text{ lbs}}{14 \text{ fish}} = 3.928571428 \text{ lbs/fish}$ Redbanded wt = 2 fish X 3.928571428 lbs/fish = 7.857142856 lbs	Spiny Dog 51 @ 206.52 SSPN 5 @ 13.75
		SKATE visuals $40 + 60 + 40 + 40 + 30 + 20 + 45 + 20 + 20 + 50 + 30 + 30 = 425 \text{ lbs}$	Spiny Dogfish Ave Wt $\frac{60.74 \text{ lbs}}{15 \text{ fish}} = 4.049333333 \text{ lbs/fish}$ DSRK wt = 51 fish X 4.049333333 lbs/fish = 206.5159999 lbs Shortspine Thornyhead (used retained ave wt) $2.75 \text{ lbs/fish} \times 5 \text{ fish} = 13.75 \text{ lbs}$	Skate = 12 @ 425.00
		PHLB $30 - 5 \times .57 \text{ lbs} = 2.85 \text{ lbs}$ $40 - 12 \times 1.43 \text{ lbs} = 17.16 \text{ lbs}$ $50 - 2 \times 2.95 \text{ lbs} = 5.90 \text{ lbs}$ $60 - 1 \times 5.31 \text{ lbs} = 5.31 \text{ lbs}$ $80 - 16 \times 13.51 \text{ lbs} = 216.16 \text{ lbs}$ $100 - 3 \times 27.87 \text{ lbs} = 83.61 \text{ lbs}$ $110 - 2 \times 37.94 \text{ lbs} = 75.88 \text{ lbs}$	PHLB wt = 41 @ 406.87 lbs	

Pot Example

Official Total Catch Calculations

Gear Units
Sampled

12 of 25

Average Soak
Time/Gear Unit:

N/A

hooks/gear unit:

Retained

Discarded

10 @ 68.49 lbs
 10 @ 68.07 lbs
 10 @ 72.51 lbs

98

Sable

66

11 @ 49.11 lbs
 3 @ 13.66 lbs
 4 @ 17.83 lbs

Grenadier

||||

7 @ 27.85 lbs
 (Market)

Tanneri
 Crabs

||||| ||||| ||||| |||||
 ||||| ||||| |||||

11 @ 6.42 lbs
 8 @ 4.81 lbs
 (Market)

Sea Whip

|

1 @ .33 lbs

Starfish

|||

2 @ .81 lbs

2 @ 5.5lbs

OTC = Sum of Catch Categories X $\frac{\text{\# of pots in set}}{\text{\# of pots sampled}}$

OTC = 1025.19 lbs X $\frac{25 \text{ pots}}{12 \text{ pots}}$ = 2135.8125 lbs

Haul #

FIXED GEAR CATCH FORM*

Page 1 of 2Date Trip Number USCG #

Catch #	R or D	Catch Category	Sample Weight	#s of Fish Req. for wt. methods 4, 6, 9	# Hooks/Pots sampled by catch category	Weight Method	Catch Purity	Discard Reason	Vessel Estimate	Comments
1	R	SABL	682.96		12	13	M			
2	D	ZMIS	342.23		↓	13	M			
Keypunch Checks			1025.19		24					

*Gear Types 6, 7, 8, 9, 10, 15, 16

January 2004

Fixed Gear Catch Form v. 4

CHAPTER 5

Haul #	0	1
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SPECIES COMPOSITION FORM

Page 2 of 2

Date	0	8	2	3	0	2
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Trip Number			1	7	6
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USCG #	1	0	6	8	3	6	1
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[illegible]

Method : 1-Whole haul species 2-Single basket 3-Multiple basket 4-Fixed Gear Sample
Reason for discard: 1-Prohibited 2-Size 3-Market 4-Regulation 5-Other 6-Drop-off 7 - Predation

Species Composition Form v.3
January 2004

Species Composition Measurements and Calculations

R or D	Catch Category	Density Samples	Measurements, Formulas, and Calculations	Total Weight
R	ZMIS 1		Sablefish Ave Wts $\frac{209.07 \text{ lbs}}{30 \text{ fish}} = 6.969 \text{ lbs/fish}$ SABL wt - 98 fish X $\frac{6.969 \text{ lbs}}{\text{fish}} = 682.962 \text{ lbs}$	SABL 98 @ 682.96
D	ZMIS 2		Sable Ave Wts $\frac{80.60 \text{ lbs}}{18 \text{ fish}} = 4.477777777 \text{ lbs/fish}$ SABL wt = 66 fish X $4.477777777 \text{ lbs/fish} = 295.5333332 \text{ lbs}$ Grenadier Ave Wts $\frac{27.85 \text{ lbs}}{7 \text{ fish}} = 3.978571428 \text{ lbs/fish}$	SABL 66 @ 295.53 GREN 6 @ 23.87
			GREN wt = 6 fish X $3.978571428 \text{ lbs/fish} = 23.87142856 \text{ lbs}$ Tanneri T. Crab Ave Wts $\frac{11.23 \text{ lbs}}{19 \text{ fish}} = .591052631 \text{ lbs/fish}$ TCRB wt = 36 fish X $.591052631 \text{ lbs/fish} = 21.27789471 \text{ lbs}$	Tanneri 36 @ 21.28 Starfish 3 @ 1.215
			Starfish Ave Wts $\frac{.81 \text{ lbs}}{2 \text{ fish}} = .405 \text{ lbs/fish}$ STAR wt = 3 fish X $.405 \text{ lbs/fish} = 1.215 \text{ lbs}$	

Stick Gear Example

Official Total Catch Calculations

 10 sticks pulled
multiple times

 Gear Units
Sampled

 Average Soak
Time/Gear Unit: 30 minutes

hooks/gear unit: 3

Set: 36 14.467 125 44.114 0935

Up: 36 14.489 125 44.138 1250

Retained

Discarded

 5.0 lbs, 2.5 lbs, 2.5 lbs, 3.0 lbs, 3.5 lbs,
2.75 lbs, 2.75 lbs, 2.0 lbs

Cabezon

1.75 lbs, 2.0 lbs, 4.0 lbs, 1.25 lbs (regs)

1.75 lbs, 1.0 lbs

Kelp Greenling

1.25 lbs

Black and Yellow RF

 .75 lbs, 1.5 lbs, .75 lbs, .75 lbs, .75 lbs,
.75 lbs, .75 lbs (regs)

 3.0 lbs, 3.25 lbs, 2.25 lbs, 2.25 lbs, 3.75
lbs, 1.89 lbs

Grass RF

1.0 lbs, 2.6 lbs (regs)

1.0 lbs

Kelp RF

Swell Shark

4.5 lbs

Blue RF

2.7 lbs, .89 lbs, 2.0 lbs, 3.3 lbs (market)

Lingcod

12.0 lbs, 9.0 lbs (regs)

Gopher

.50 lbs, 2.1 lbs (regs)

Sunstar

1.0 lbs, .5 lbs, .5 lbs

 Total Hooks in Set = 39 sticks X $\frac{3 \text{ hooks}}{\text{stick}}$ = 117 hooks

OTC = Retained + Discarded = 45.39 lbs + 57.59 lbs = 102.98 lbs

Haul #

FIXED GEAR CATCH FORM*

Page 1 of 2Date Trip Number USCG #

Catch #	R or D	Catch Category	Sample Weight	#'s of Fish Req. for wt. methods 4, 6, 9	# Hooks/Pots sampled by catch category	Weight Method	Catch Purity	Discard Reason	Vessel Estimate	Comments
1	R	ZMIS	45.39		117	13	M			
2	D	ZMIS	57.59		↓	13	M			
Keypunch Checks			102.98		234					

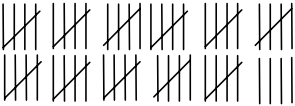




*Gear Types 6, 7, 8, 9, 10, 15, 16

January 2004

Fixed Gear Catch Form v. 4

Rod and Reel Example

Official Total Catch Calculations

Gear Units Sampled		Average Soak Time/Gear Unit:	# hooks/gear unit: 6
Set: 38 21.59	120 16.478	0730	50 FEET (8 fathoms)
Up: 38 21.79	120 16.482	1030	
Retained		Discarded	
		2 @ 1.5 lbs 1 @ .75 lbs 1 @ .75 lbs 2 @ 1.75 lbs 1 @ .75 lbs 1 @ .75 lbs (regs) 1 @ .75 lbs 1 @ .75 lbs	
		Black and Yellow RF Vermillion RF	
		Gopher RF	
		Lingcod Cabezon	
		1 @ 2.75 lbs 1 @ 2.25 lbs 1 @ 3.75 lbs 1 @ 2.25 lbs 1 @ 3.50 lbs 1 @ 4.50 lbs (regs) 1 @ 2.00 lbs 2 @ 6.50 lbs 1 @ 4.00 lbs 1 @ 7.00 lbs	
		Kelp Greenling	
		2 @ 1.75 lbs 1 @ 1.25 lbs 1 @ 1.00 lbs 1 @ 1.50 lbs (regs) 1 @ 1.00 lbs	

Total Hooks in Set = 59 rods X $\frac{6 \text{ hooks}}{\text{stick}}$ = 354 hooks

OTC = Retained + Discarded = 40.23 lbs + 52.75 lbs = 92.98 lbs

CHAPTER 5

Haul #

FIXED GEAR CATCH FORM*

Page 1 of 2

Date

Trip Number

USCG #

Catch #	R or D	Catch Category	Sample Weight	#s of Fish Req. for wt. methods 4, 6, 9	# Hooks/Pots sampled by catch category	Weight Method	Catch Purity	Discard Reason	Vessel Estimate	Comments
1	R	ZMIS	40.23		354	13	M			
2	D	ZMIS	52.75		↓	13	M			
Keypunch Checks			92.98		708					

*Gear Types 6, 7, 8, 9, 10, 15, 16

January 2004
Fixed Gear Catch Form v. 4

Page 2 of 2

USCG #							
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Species Composition Form v.3
January 2004

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Species Composition Measurements and Calculations

R or D	Catch Category	Density Samples	Measurements, Formulas, and Calculations	Total Weight
R	ZMIS 1	Average Weights for Retained from Fish Ticket Weights	Fish Ticket Weights Black N Yellow: 35 lbs (Total of 38 fish caught on trip) Vermillion: 14.5 lbs (Total of 5 fish caught on trip) Gopher: 27 lbs (Total of 34 fish caught on trip) Lingcod: 21 lbs (Total of 4 fish caught on trip)	
			Black N Yellow Ave Wts $\frac{35 \text{ lbs}}{38 \text{ fish}} = .921052631 \text{ lbs/fish}$ BNY wt = 13 fish X .921052631 lbs/fish = 11.05263157 lbs	BNY 12 @ 11.05
			Vermillion Ave Wts $\frac{14.5 \text{ lbs}}{5 \text{ fish}} = 2.90 \text{ lbs/fish}$ VERM wt = 2 fish X 2.90 lbs/fish = 5.8 lbs	Verm 2 @ 5.8
			Gopher Ave Wts $\frac{27 \text{ lbs}}{34 \text{ fish}} = .794117647 \text{ lbs/fish}$ GOPH wt = 3 fish X .794117647 lbs/fish = 2.382352941 lbs	GOPH 3 @ 2.38